



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
-----------------	-------------	----------------------	---------------------	------------------

10/724,615

12/02/2003

Yoshihiko Imanaka

032152

2602

38834 7590 10/26/2007
WESTERMAN, HATTORI, DANIELS & ADRIAN, LLP
1250 CONNECTICUT AVENUE, NW
SUITE 700
WASHINGTON, DC 20036

EXAMINER

KEMMERLE III, RUSSELL J

ART UNIT

PAPER NUMBER

1791

MAIL DATE

DELIVERY MODE

10/26/2007

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/724,615

Applicant(s)

IMANAKA ET AL.

Examiner

Russell J. Kemmerle

Art Unit

1791

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 09 October 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 21,22 and 24-32 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 21,22 and 24-32 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 112

Claim 32 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. The subject matter of screen-printing a material to form a second stress mitigating layer, as recited in newly added claim 32, is not supported by the specification as originally filed. If support for such a limitation is included in the original specification the applicant is invited to point out where in the specification such support could be found.

Claim Rejections - 35 USC § 103

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claims 21, 22, 24-27 and 29-31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Otsuki (US Published Application 2006/0,165,875) in view of Miyazaki (U Published Application 2001/0,010,617) and Ushikoshi (US Patent 5,683,606).

Referring to claim 21, Otsuki discloses creating a substrate by forming several layers, each layer containing conducting and insulating regions, the layers being formed sequentially on top of one another (see Claims 1-5). Specifically, Otsuki discloses forming multiple regions on an individual layer of different materials, then forming

Art Unit: 1791

directly on top of that layer, a second layer comprised of multiple regions and multiple materials, which is continued with layers being built directly on top of each other (see pages 3-4, paragraphs 0095-0134). Otsuki specifically discloses that the structure is formed on a substrate (i.e., a base), which is later removed (Page 12, sixth embodiment, paragraphs 288-289).

Otsuki does not disclose the method of forming the layers by screen-printing each of the conducting and insulating regions.

Miyazaki discloses screen printing a layer of conductive material over a base layer (page 4, paragraph 0061) and then screen printing a ceramic layer on the base layer in the areas in which the conductive material was not printed, thus forming a layer having both a conductive material region and a ceramic material region (page 4, paragraph 0062). Miyazaki goes on to disclose releasing the created layer from the support it was printed on (page 4, paragraph 0064) and firing the layer (page 4, paragraph 0065).

It would have been obvious to one of ordinary skill in the art, at the time of invention by applicant, to modify the method taught by Otsuki by depositing the material by screen printing as taught by Miyazaki since Otsuki discloses the method of forming the substrate by depositing layers of conducting and insulating regions on top of the previous layer, and Miyazaki discloses that screen printing is an effective means for depositing regions of conducting and insulating materials.

Otsuki and Miyazaki fail to disclose using a material to act as a stress-mitigating region between two other regions.

Ushikoshi discloses placing a protective or stress mitigating layer between different materials to reduce the likelihood of cracks or other problems in the laminated piece (Col 9, lines 1-5).

It would have been obvious to one of ordinary skill in the art, at the time of invention by applicant, to modify the method taught Otsuki and Miyazaki of screen printing a layer containing both an insulative and conductive region by adding a third stress mitigating region as taught by Ushikoshi since Otsuki and Miyazaki place no limit on the number of regions which could be screen printed on one layer, and Ushikoshi discloses the desirability of a stress mitigating layer to help reduce cracking and other problems in a laminated piece. It would have been within the abilities of one of ordinary skill in the art to alter the teachings of Ushikoshi in order to optimize the material used in the stress mitigating layer based and the properties of the material desired (i.e., electrical or mechanical properties) and the stress mitigating properties desired (i.e., shrinkage during sintering or thermal expansion during operation).

Referring to claim 22, Otsuki is relied upon as discussed above. Otsuki further teaches forming electronic components (such as a capacitor, resistor, diode, transistor, etc.) in one or more of the layers of the substrate by depositing a material with the desired characteristics on one of the layers (see Claims 14-18). Otsuki discloses creating several different types of electronic components (e.g., capacitor, resistor, diode, transistor, etc.), which would necessarily have different dielectric constants.

Referring to claim 24, Ushikoshi discloses using Molybdenum Carbide as a stress-mitigating region between regions of Molybdenum metal and Molybdenum Oxide

Art Unit: 1791

(the Molybdenum having at least one component from the material on each side of it, in both cases Molybdenum) (Col 8 lines 29-36).

It would have been obvious to one of ordinary skill in the art, at the time of invention by applicant, to modify the method taught Miyazaki of screen printing a layer containing both an insulative and conductive region by adding a third stress mitigating region as taught by Ushikoshi since Miyazaki places no limit on the number of regions which could be screen printed on one layer, and Ushikoshi discloses the desirability of a stress mitigating layer to help reduce cracking and other problems in a laminated piece. It would have been further obvious to one of ordinary skill in the art, at the time of invention by applicant, to have created the stress mitigating region using a material with a composition middle between the two proximate materials since Ushikoshi discloses using Molybdenum Carbide as a stress mitigating region between regions of Molybdenum metal and Molybdenum Oxide.

Referring to claim 25 Otsuki is relied upon as discussed above. Otsuki further teaches forming a conductive section inside an insulative layer to electrically connect conductive sections above and below the insulative layer (i.e., a via) (page 12, paragraph 0286).

Referring to claim 26, Otsuki is relied upon as discussed above. Otsuki further discloses that the via is formed by depositing a post on top of a conductive section to electrically connect the lower conductive layer to an upper conductive layer (page 12, paragraph 0286).

Art Unit: 1791

Referring to claim 27, Miyazaki further discloses that conductive paste can be screen printed on to a base layer, in order to form a conductive layer (page 1, paragraph 7).

Referring to claim 29, Otsuki is relied upon as discussed above. Otsuki discloses creating a capacitor in the substrate (page 13, paragraph 0294) and other electronic components (such as a resistor, diode, or transistor) (Claims 14-18).

Referring to claim 30, Otsuki is relied upon as discussed above. Otsuki further discloses placing a second layer of an insulative material over the conductive layer to bury it (see Fig 23, showing conductive layers, 410 and 412, completely covered by an insulative layer, unnumbered).

Referring to claim 31, Otsuki is relied upon as discussed above. Otsuki further discloses a first and third layer made of a conductive material, and a second layer made out of an insulator to form a capacitor (i.e., a passive element) (page 13 paragraph 0294).

Claim 28 is rejected under 35 U.S.C. 103(a) as being unpatentable over Otsuki, Miyazaki and Otsuki in view of Yamana (US Published Application 2003/0,230,374).

Otsuki, Miyazaki and Otsuki are relied upon as discussed above in the rejection of Claim 27.

Otsuki and Miyazaki do not disclose, after screen-printing a conductor layer on the base layer, pressurizing the basic layer and conductor layer to planarize the basic layer and conductor layer.

Yamana discloses coating an electrode paste on to a ceramic green sheet, and then subjecting the combined layer to a pressure in order to smooth it (page 6, paragraph 0093, Claim 1).

It would have been obvious to one of ordinary skill in the art, at the time of invention by the applicant, to modify the method of screen printing a conductive layer on to a base layer as taught by Otsuki and Miyazaki by adding the step of applying pressure to the combined layer to smooth the surface as disclosed by Yamana, since Yamana discloses that adding the step of pressurizing the layer helps reduce cracking and delamination in the final piece.

Response to Arguments

Applicant's arguments filed 09 October 2007 have been fully considered but they are not persuasive.

Applicant argues that Ushikoshi's molybdenum carbide is not a dielectric material (section 5 of the Applicant's remarks), and further that the body formed by Ushikoshi as a heater having a spirally coiled body, not a substrate (section 9). Applicant argues still further that Ushikoshi is not analogous art (section 10) and that the composition of the stress mitigating layer of Ushikoshi is different than the invention of claim 24, because molybdenum carbide and molybdenum oxide does not include a metal of molybdenum as a component (section 11)

Referring to the applicant's first two arguments above (not a dielectric material and not a substrate), Ushikoshi is not relied on as teaching the exact method claimed by the current invention. Ushikoshi is relied upon to teach the solution of the same

Art Unit: 1791

problem with which the current inventor, that is, how to reduce stress (which can lead to cracking) between two different materials which exhibit different properties. One skilled in the art with this knowledge, and facing the problem encountered by the current inventors, would thus find it obvious to solve the problem of the electric substrates using the same technique as Ushikoshi, that is, to create a stress mitigating layer between the materials.

Applicant's argument that Ushikoshi is not analogous art is not considered persuasive because it is directed to the problem with which the inventor was trying to solve (a stress forming between two different materials due to different properties of those two materials). "In order to rely on a reference as a basis for rejection of an applicant's invention, the reference must either be in the field of applicant's endeavor or, if not, then be reasonably pertinent to the particular problem with which the inventor was concerned." *In re Oetiker*, 977 F.2d 1443, 1446, 24 USPQ2d 1443, 1445 (Fed. Cir. 1992). See also *State Contracting & Eng 'g Corp. v. Condotte America, Inc.*, 346 F.3d 1057, 1069, 68 USPQ2d 1481, 1490 (Fed. Cir. 2003) (where the general scope of a reference is outside the pertinent field of endeavor, the reference may be considered analogous art if subject matter disclosed therein is relevant to the particular problem with which the inventor is involved).

Applicant's argument that metal molybdenum is not a component of molybdenum oxide and molybdenum carbide is also not considered persuasive, since molybdenum particles would in fact be a part (i.e., component) of both the oxide and carbide.

Art Unit: 1791

Applicant argues that Otsuki's process cannot be replaced with Miyazaki's screen-printing method (section 6). It is not suggested that the process of Otsuki could be switched to screen-printing with out any other changes being made. However, since both screen-printing and ink or bubble jet printing are known methods of creating a substrate with a high degree of control over the layers, where each layer may have several regions made of different materials (as shown by Otsuki and Miyazaki), one of ordinary skill in the art would be able to modify the method of Otsuki, to develop a screen-printing method where the building of the layers was substantially similar to that of Otsuki, thus rendering the current invention obvious.

Applicant argues that none of the references teach the "base" of the current invention (section 7). As noted above, Otsuki discloses such a "base" in the sixth embodiment.

Applicant argues that none of the references using different dielectric materials to form an individual layer (section 8). Both Otsuki and Miyazaki disclose forming layers having multiple materials, as discussed above, which would each have different dielectric constants.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Russell J. Kemmerle whose telephone number is 571-272-6509. The examiner can normally be reached on Monday through Friday, 8:30-4:00 EST.

Art Unit: 1791

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Steven Griffin can be reached on 571-272-1189. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/RJK/



STEVEN P. GRIFFIN
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 1700